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TITLE: HCMM - Soil Moisture in Relation to Geologic Structure and
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General Statement:

Image products, which were received late in the quarter, cover the time period from May 30 to December 14, 1978 and include various types of imagery for about 25 different days within this time period.

The photographic quality of the images varies from "excellent" to "unusable" in each of the various types (Day-Vis, Day-IR and Nite-IR). In general, the Day-Vis images are too dark-toned for practical use and the Day-IR are too light-toned to detect detail.

The types of imagery received is also variable. Except for a few dates, Day-IR and its related Nite-IR have not been received so that qualitative comparisons is difficult. Retrospective orders are being prepared to overcome this deficiency. Temperature differences and thermal inertial maps also will be retrospectively ordered for certain specific dates, when the data becomes available from NASA.

Accomplishments:

1. During the quarter, each of the images was logged-in, examined, classified relative to quality and applicability and reviewed for possible retrospective orders.

2. In addition to visual evaluation for geologic purposes, crude and preliminary experiments were performed on the available and appropriate sets of images to qualitatively determine the significance of Day- and Nite-IR temperature differences. Diazo transparencies were prepared for the Day-IR and the Nite-IR images, each in a separate diazo color, and registry of the two prints were viewed over a light table. The preliminary results suggest that the 2-color composite may serve as a crude qualitative measure of the temperature difference and may permit the detection of subtle temperature changes that may be unrecognizable on the original image data. The experiment was only partly successful because of the lack of some of the appropriate images and because of some registry difficulties. However, work will continue on this method of evaluation or, perhaps, be modified to include a two-color projection system for additive color enhancement.

Significant Results:

First-look qualitative geologic-evaluation of the Day- and Nite-IR images of the Northern Coast Ranges have disclosed several en echelon linear features (Dark-toned on both Day- and Nite-IR) which extend throughout the central part of the Northern Coast Range in California, across the Mendocino triple junction and into southern Oregon. Preliminary examination of these features with respect to topographic expression, vegetation, sun angle and azimuth, and atmospheric conditions accompanied by comparison with Landsat images, geologic maps and a review of published literature (Rich and Steele, 1974; Herd, 1978; and Dott, 1979) suggests that these features may be related to the "intracontinental plate boundary" (Lake Mountain Fault zone of Herd) of the Humbolt Plate. The linear features cut-across several climatic zones and differently vegetated regions. Further, they are not confined to topographic valleys, but cross the ridges and valleys at varying angles. The explanation for these thermal anomalies is not fully understood, at present, but laboratory and field-work will continue.

Although the alluviated part of the Sacramento Valley, California (irrigated croplands) and the bordering foothills (grassland) can be differentiated from the Coast Range on the west (brushland and forest) and the Modoc Plateau and Sierra Nevada on the east (forested), the thermal difference seems to be a function of vegetation type. Lithology within the Great Valley Sequence (Late Mesozoic marine sedimentary rock along the western foothill belt) can be detected on a few of the images; however, preliminary evaluation suggests that the thermal banding observed may be a function of sun azimuth or late-day sun angle. However, soil moisture, related to lithologic composition, cannot be ruled out at this time.